

## SOIL

### WHAT is soil?

Soil is a natural resource made up of minerals, organic matter and living organisms.<sup>1</sup> Soil contains spaces to accommodate air and water. It also teems with life such as bacteria, fungi, small mammals (mice and gophers), earthworms and insects.

Healthy soil contains a balance of minerals, air, water and organic matter that makes it suitable for growing crops, as well as providing a home for diverse soil organisms.



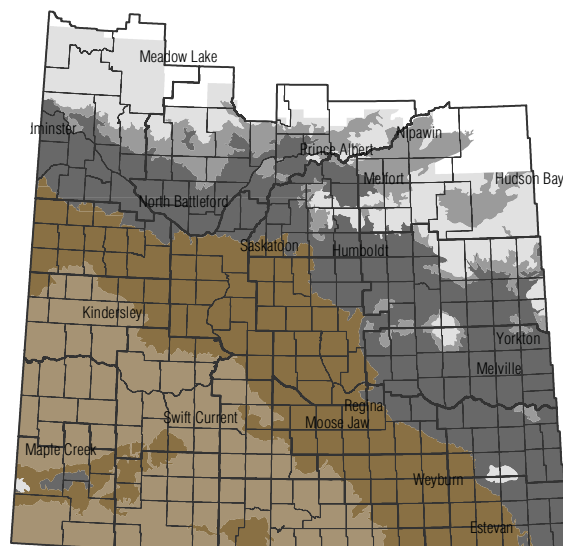
### Do all farms have the same soil?

**No.** Soil types vary from region to region in Canada. For example, soil on a Prince Edward Island farm is different from soil on an Ontario farm. Soil on a farm near Saskatoon is different from soil on a farm in southwestern Saskatchewan.

## SOIL ZONES

**Soil zones** are land areas that are described by the colour of their topsoil due to different amounts of soil organic matter. In Saskatchewan, for example, soil zones are classified as **brown, dark brown, black** or **dark gray**.<sup>2</sup>

Certain crops and vegetation grow best in particular soil zones. The black soil zone is very productive because the topsoil contains high amounts of organic matter.



Soil Zones of Saskatchewan

### WHAT SOIL LOOKS LIKE

Soil is made up of parallel horizontal layers called **horizons**. Each soil horizon differs from the one above or below it due to variations of colour, structure, texture and mineral composition. **Soil structure** is determined by how soil particles cling together. **Soil texture** is determined by proportions of sand, silt and clay.

The first horizon is the surface layer called **topsoil**. It is about 10-25 cm deep and is essential for growing plants. It contains a large amount of organic matter, nutrients and water that are vital for sustaining a healthy environment for soil life.



## Soil is alive!

5 ml of healthy soil contains more microorganisms than there are people on earth.



Farmer collecting soil sample to test for nutrient content



# SOIL

## HOW DO SOIL TYPES AFFECT FARMERS?

The type of soil on a farm may influence what crops are grown. Root crops such as potatoes and carrots grow best in sandy textured soil and grain crops are well suited to many soil textures.

## How farmers build better soil

- **Testing soil** for soil composition and to find out which nutrients need to be added to grow crops.
- **Minimizing soil disturbance** by practicing **conservation tillage** in which the ground is covered with plant residues. This helps keep the soil in place and stop soil erosion, as well as improves soil water-holding capacity and the ability of soil to take up water and move it throughout the soil. This is important for plant growth, particularly during dry spells.
- **Increasing soil organic matter** by leaving the remnants of last year's crop (**crop residues**) in the field. Some farmers add manure or compost to fields in fall.
- **Adding nitrogen to the soil** by growing legumes (e.g., alfalfa, soybeans, lentils - also called **nitrogen-fixing** plants)
- **Planting trees or shrubs** in **shelterbelts** around fields to reduce soil erosion and help build organic matter
- **Growing another crop** (called a **cover crop**) with or after the main crop to hold soil together and prevent soil erosion. Legumes (e.g., peas, beans, lentils) are often used as cover crops.



## FACTORS AFFECTING SOIL FORMATION<sup>3</sup>

- **Climate** – precipitation, temperature, wind, sunlight
- **Organisms/vegetation** – organisms in the soil and vegetation (influenced by climate)
- **Topography** – shape of the land surface (hilltops, side slopes, depressions, or flat areas)
- **Parent material** – type of sediments or rocks in which soils form (e.g., In Saskatchewan, parent material is mostly **glacial till** sediment left behind from the passage of glaciers over the earth's surface.)
- **Time** – As soils age, minerals change from one form to another and organic matter accumulates



Seeding using conservation tillage

Soil structure **refers to how soil particles (sand, silt and clay) are clumped together and arranged.** Conservation tillage helps improve soil structure.



Healthy soil is important for growing plentiful, high quality food.

## Plants help soil!



Lentil crop